UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Partial Waiver Allowing E15 Sale for Use in MY2001-2006 Light-duty Motor Vehicles under Clean Air Act Section 211(f)(4)

FROM: Margo Tsirigotis Oge, Director
Office of Transportation and Air Quality

TO: Gina McCarthy
Assistant Administrator

On January 21, 2011, EPA granted a conditional, partial waiver under Clean Air Act (CAA or the Act) section 211(f)(4) allowing up to 15 volume percent ethanol in gasoline (E15) to be introduced into commerce for use in model year (MY) 2001-2006 light-duty motor vehicles. 76 FR 4662 (January 26, 2011). The partial waiver was based on a determination by EPA that the use of E15 would not cause or contribute to failure of these motor vehicles to meet the applicable emissions standards over their full useful lives. We recently discovered a minor, inadvertent error in a technical analysis of Department of Energy (DOE) Catalyst Study test results for MY2001-2006 vehicles conducted as part of our consideration of the E15 waiver application. As a result of the manufacturer's incorrect Vehicle Emissions Control Information (VECI) label,[1] we compared the test results for a single vehicle model, the MY2002 Nissan Frontier light-duty truck, to the wrong emission standards. This memorandum describes the error and a minor technical correction to one component of EPA's analysis in light of the error. As explained below, the corrected analysis is consistent with and supportive of the factual and analytical bases for the January 2011 partial waiver decision, and the error has no material impact on the analyses that informed the waiver decision. At the end of the memorandum is a section where you may indicate whether you concur with our assessment.

Summary

At the outset, it is important to make clear the very limited, technical nature of the error we have identified. It has no impact on the E15 partial waiver decision for MY2007 and newer light-duty motor vehicles. It does not change or affect in any way the test data from DOE's Catalyst Study used in evaluating whether to grant a partial waiver for MY2001-2006 light-duty motor vehicles. It does not affect EPA's engineering assessment that design changes made by vehicle manufacturers to MY2001-2006 light-duty motor vehicles in response to tightening emissions standards, other regulatory changes and growing use of ethanol in gasoline, along with the large compliance margins typically built into

[1] Under EPA regulations that implement motor vehicle emission standards, vehicle manufacturers are required to affix a VECI label to every vehicle to identify the vehicle's emissions test group as determined in the pre-production certification process and the corresponding applicable emissions standards.

those vehicles, mean that long-term use of E15 is not expected to lead to significant emission increases or to cause or contribute to MY2001-2006 1vehicles failing to meet emission standards. It also does not affect EPA's emissions deterioration analysis, based on the DOE test data, that the use of E15 over time does not adversely impact emissions compared to E0 (gasoline with no ethanol).

The only change is to our analysis of how many test vehicles exceeded emissions standards when operated on E15 compared to operation on E0. This comparison provided additional support for the conclusions drawn from the engineering assessment and the emissions deterioration analysis. At the time of the MY2001-2006 partial waiver decision, EPA believed that all of the test vehicles operated on E15 were below their emission standards at all stages of testing with the exception of one vehicle (a Honda Accord) that exceeded one standard at the end of testing. In comparison, EPA noted that three test vehicles operated on E0 exceeded one or more standards during testing. EPA has now determined that the MY2002 Nissan Frontier test vehicle operated on E15 exceeded one standard, for nonmethane organic gases (NMOG), by 0.003 grams per mile (0.090 versus 0.093) when tested at 140,000 miles, 40,000 miles beyond the vehicle's full useful life (FUL) after which emission standards no longer apply. The E15 Frontier's small exceedance of the NMOG standard at very high mileage has little impact on our overall analysis of emission exceedances of MY2001-2006 test vehicles. After incorporating the E15 Frontier's exceedance into that analysis, it remains the case that more E0 test vehicles had more total emissions exceedances than did E15 vehicles. Specifically, three E0 test vehicles experienced a total of six exceedances whereas two E15 vehicles had a total of two exceedances. Moreover, the emissions deterioration analysis of the full set of DOE MY2001-2006 test data, including for the Frontier, indicates that E15 is not likely the cause of the MY2001-2006 test vehicles' emissions exceedances. As we also noted in the MY2001-2006 partial waiver decision, test results of vehicles at very high mileage are relatively variable as a result of the challenges presented by testing older vehicles.

The engineering assessment continues to show that long-term use of E15 by MY2001-2006 light-duty motor vehicles is not expected to lead to significant emissions increases and to cause or contribute to failures to meet applicable exhaust emission standards.[2] The emissions deterioration analysis of all the MY2001-2006 test vehicles, including the Frontier, continues to show that the use of E15 over time does not adversely impact emissions compared to E0. The results of the DOE test program, including the corrected analysis of exceedances, continue to confirm the engineering assessment and provide compelling support for the conclusion that long-term use of E15 is not expected to cause or contribute to MY2001-2006 light-duty motor vehicles exceeding their exhaust emissions standards over their FUL. Viewed in context, the error we have discovered is minor in nature and does not have a material impact on our analyses of exhaust emissions impacts of E15 compared to E0.

Background

In comparing the test results of vehicles in DOE's Catalyst Durability Study to emission standards, we considered the test group stated on the VECI labels of the test vehicles and certification records in determining what standards apply. Specifically, EPA's certification records for the test group[3] identified

[2] It is worth noting that the corrected analysis does not pertain to, and in no way affects, EPA's evaluation of the effects of E15 on evaporative emissions. It also has no effect on our engineering assessment and analysis of the immediate impact of E15 on NOx emissions compared to E0.

[3] Under EPA's regulations for certifying vehicles, manufacturers may group vehicle models that have similar engines and emissions characteristics and that are subject to the same emission standards into a single test group for emissions certification purposes. The manufacturer is required to indicate the test group number for each model on the VECI label affixed to the vehicle. The test group number on the VECI label is used by EPA and some states to determine the emissions standards applicable to the vehicle model for in-use testing purposes.

by the Frontier's VECI label, 2NSXT02.4C4B, indicated that this test group was certified to emissions standards applicable to an NLEV LEV LDT2, a category of light-duty trucks. Based on a comparison of the Frontier's test results to LDT2 emission standards, we found that the Frontier test vehicle operated on E15 met all of the standards throughout testing. EPA so indicated in the table provided in the MY2001-06 partial waiver decision document (see Table 1 below).

As DOE was completing its final report of the Catalyst Study, we became aware that an error may have been made in our comparison of the Frontier's test results to emissions standards. The DOE contractor that tested the Frontiers had found that the test group listed for the Frontier in an EPA database could only be found on the VECI label in Nissan Xterra vehicles and the test group listed for the Xterra could only be found on the VECI label in Frontier vehicles. The contractor photographed a Frontier and its VECI label (see picture below). The contractor also weighed two of the Frontiers and found they weighed 3,100 and 3,200 pounds.[4] The contractor consulted Nissan, which indicated that the Frontier should be tested as LDT1, a lighter category of trucks. Based on that information, the contractor tested the Frontier as an LDT1.

To ascertain the correct emissions standards category for the Frontier, we further reviewed our certification records for the MY2002 Nissan Frontier in light of various flexibilities provided to

[4] An individual vehicle's curb weight does not determine the emission standards that apply to that vehicle. EPA certification regulations prescribe how the curb weight for a vehicle model is to be determined for purposes of determining what emission standards apply to vehicles of that model.

manufacturers under certification regulations, including the ability to add vehicle models to a test group and to make changes to vehicle models within a test group (known as a running change). We found that Frontier's certification records did not match the VECI labels of the Frontier test vehicles and, considering the information the manufacturer had provided to the DOE contractor, concluded that the Frontier test vehicles should have been classified as subject to LDT1 emissions standards. On February 17, 2012, Nissan provided EPA with a copy of a December 11, 2001 letter addressed to the Agency showing that a typographical error had been made on the VECI labels of the MY2002 Frontier and Xterra vehicles. The letter stated that the Frontier's VECI label bore the test group number for the Xterra, an LDT2, and Xterra's VECI label bore the test group number for the Frontier.[5]

Analysis of Frontier as an LDT1

As noted above, considering the Nissan Frontier as an LDT1 instead of an LDT2 is relevant to only one supporting element of EPA's MY2001-2006 waiver analysis, and its impact is negligible. The error is limited to our analysis of the extent to which E15 test vehicles exceeded emission standards compared to E0 test vehicles. This comparison was cited as additional support for the conclusions drawn from the engineering assessment and the emissions deterioration analysis of the test results. Applying the LDT1 emissions standards to the emissions test results for the Frontier leads to one small change in the comparison. Both the E0 and E15 MY2002 Nissan Frontier light-duty trucks passed the appropriate NOx and CO emission standards through the end of the test at 140,000 miles (40,000 miles beyond the vehicle's FUL). The E15 MY2002 Nissan Frontier light-duty truck passed the NMOG standard through 116,000 miles (16,000 miles beyond its FUL) but exceeded the 0.090 g/mile NMOG standard by 0.003 g/mile, or 3%, at the 140,000-mile end of test. Hence, Table IV.A-2 in the notice of the MY2001-2006 partial waiver decision should have indicated a "fail" for this vehicle when tested at the end of the test program for a single pollutant, NMOG.[6]

The exceedance of the NMOG standard by the E15 Frontier test vehicle does not materially impact the engineering assessment, the emissions deterioration analysis, or the conclusions drawn from those analyses regarding emission control designs, emissions trends and emissions increases related to the MY2001-2006 waiver determination.

The corrected technical analysis does not change the engineering assessment of the design changes vehicle manufacturers had made to MY2001-2006 vehicles in response to tightening emission standards and test procedures and growing market penetration of gasoline-ethanol blends, and the large compliance margins associated with these emissions control systems. That assessment concluded that, as a result of those design changes, long-term use of E15 by MY2001-2006 vehicles is not expected to lead to significant emission increases or to cause or contribute to failures to meet applicable exhaust emission standards. 76 FR 4666-69.

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[5] In its December 11, 2001letter, which EPA has no evidence of receiving, Nissan stated that it was self-approving a running change to its Frontier and Xterra certification applications to switch the test group numbers for the Frontier and Xterra so that, in effect, the mistaken labels would become correct. Nissan's letter also stated that the manufacturer did not intend to change its certification documentation for the two vehicle models or correct the VECI labels applied to those models. EPA certification regulations do not permit a running change to be used for this purpose, and in any event, a manufacturer making a running change is required to revise the relevant certification documentation.

[6] EPA conducted this "pass/fail" analysis recognizing that many of the vehicles were tested at points when they were past the end of the useful life period over which the emissions standards apply. As such the vehicles could not actually fail the standard as it does not apply after the end of the useful life. EPA conducts this kind of analysis notwithstanding the mileage of the vehicle, as it provides information that can be relevant in evaluating the impact of a fuel on emissions deterioration or other issues relevant to deciding whether to grant a waiver. See 75 FR 68094, 68147-8 (November 4, 2010), 76 FR 4662, 4682 (January 26, 2011).

The corrected technical analysis does not change the emissions deterioration analysis based on the emissions data from the DOE Catalyst Study. Since DOE consistently tested the Frontier as an LDT1, the emissions data it generated for that vehicle model remain valid. The deterioration analysis indicates that use of E15 over time does not adversely impact emissions compared to E0. As discussed in the January 2011 partial waiver decision, the DOE test data showed that "[t]here were no trends or patterns that appeared fuel related. No significant increases in long-term exhaust emissions were observed with the E15 vehicles. Furthermore, the test results show that the vehicles aged and tested on E15 did not have significantly higher emissions than the vehicles aged and tested on E0, and some vehicles' emissions actually decreased on E15. Overall, the exhaust emission test results across test vehicles were generally similar with regard to deterioration and failure rates to the test results observed for the Tier 2 vehicle test fleet (which included some MY2005 and 2006 motor vehicles) and discussed in the October Waiver Decision." 76 FR at 4670. EPA also noted that "[c]onsidering the higher variability expected in this situation [i.e., testing older vehicles], there were generally small changes in emissions (both increases and decreases) with mileage accumulation for most of the motor vehicles (with the exception of the Honda Accord samples) with no indication of significant deterioration of the exhaust emission control system, including the catalyst, due to E15." 76 FR at 4670. Nothing has changed the basis for these analyses of the emissions data and the conclusion drawn from them that long-term use of E15 is not expected to have an adverse impact on the deterioration of exhaust emissions from MY2001-2006 light-duty motor vehicles.

Even after the Frontier correction is made, more MY2001-2006 test vehicles operated on E0 exceeded the emissions standards more often than test vehicles operated on E15. Three E0 test vehicles exceeded standards a total of six times, including two times at the midpoint of testing, while two E15 vehicles exceeded standards a total of two times, both at the end of testing and at very high mileage. As discussed below, the corrected comparison continues to support the conclusions drawn from EPA's engineering analysis and the emissions deterioration analysis. And lastly, the Frontier's exceedance of the NMOG standard at 140,000 miles was very small, only 0.003 grams per mile. Considering the emissions deterioration analysis of MY2001-2006 test vehicle data, which included the Frontier's, E15 is not likely to have caused the exceedance.

The corrected analysis comparing MY2001-2006 test vehicles' emissions with applicable emission standards is consistent with and supportive of the conclusion of the engineering assessment and the deterioration analysis that E15 is not expected to have an adverse impact on the deterioration of exhaust emissions from MY2001-2006 light-duty motor vehicles. The E15 test vehicles met applicable emissions standards throughout testing, with the exception of the Honda Accord and the Nissan Frontier exceeding only the NMOG standard and only at the end of testing, when both vehicles had accumulated mileage beyond their FUL of 100,000 miles. The Accord's exceedance was not attributed to the fuel, since the E0 Accord also exceeded the same standard at lower mileage. The Frontier's exceedance occurred only at very high mileage and by only a small amount, and is not attributable to the fuel used in light of the conclusions of the deterioration analysis of the DOE test results for MY2001-2006 test vehicles. While the difference between the number of "failures" for E0 and E15 is somewhat less striking than the original tally, what has not changed is that there were more "failures" by E0 test vehicles than by E15 test vehicles among the MY2001-2006 test group. Overall, the results of the DOE test program continue to "confirm the engineering analysis" and "provide compelling support" for the conclusion that long-term use of E15 is not expected to cause or contribute to MY2001-2006 light-duty vehicles exceeding their exhaust emissions standards over their FUL. 75 FR at 4670, 4671.

Recommendation

In view of the lack of impact on the engineering assessment and the emissions deterioration analysis, the limited nature of the E15 Frontier exceedance of the NMOG standard at 140,000 miles, where the deterioration analysis indicates that E15 is not the likely cause of the exceedance, and the fact that the corrected comparison of test results to emission standards is consistent with and supportive of the conclusions drawn from the engineering and deterioration analyses, the error in the original comparison is minor in nature and has no material impact on the analyses that informed the decision to grant the partial waiver for the MY2001-2006 light-duty motor vehicles. Should you concur with this assessment, a copy of this memorandum with your signature below will be submitted to the docket for the January 2011 E15 partial waiver decision.

CONCUR: 

NONCONCUR:_____

DATE: FEB 27 2012

Gina McCarthy
Assistant Administrator
Office of Air and Radiation

Table 1. Pass Fail table form the MY 2001 to 2006 waiver decision document

TABLE IV.A–2—E15 EMISSION TEST RESULTS COMPARED TO THE RESPECTIVE CERTIFICATION STANDARDS AT START, MIDDLE, AND END OF TEST

Year	Make	Model	Cert Standard	THC	NMHC	NMOG	CO	NO_x
E15 Start of Test Program Pass/Fail Results								
2002	Nissan	Frontier	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2002	Dodge	Durango	Tier 1/LDT3	Pass	Pass	N/A	Pass	Pass.
2003	Chevy	Cavalier	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2003	Ford	Taurus	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2003	Toyota	Camry	ULEV	N/A	N/A	Pass	Pass	Pass.
2000	Ford	Focus	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2000	Honda	Accord	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2000	Chevy	Silverado	Tier 1/LDT3	Pass	Pass	N/A	Pass	Pass.
E15 Middle Test Program Pass/Fail Results								
2002	Nissan	Frontier	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2002	Dodge	Durango	Tier 1/LDT3	Pass	Pass	N/A	Pass	Pass.
2003	Chevy	Cavalier	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2003	Ford	Taurus	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2003	Toyota	Camry	ULEV	N/A	N/A	Pass	Pass	Pass.
2000	Ford	Focus	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2000	Honda	Accord	NLEV(LEV)	N/A	N/A	Pass*	Pass	Pass.
2000	Chevy	Silverado	Tier 1/LDT3	Pass	Pass	N/A	Pass	Pass.
E15 End of Test Program Pass/Fail Results								
2002	Nissan	Frontier	NLEV(LEV)	N/A	N/A	Pass	Pass*	Pass.
2002	Dodge	Durango	Tier 1/LDT3	Pass	Pass	N/A	Pass	Pass.
2003	Chevy	Cavalier	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2003	Ford	Taurus	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2003	Toyota	Camry	ULEV	N/A	N/A	Pass	Pass	Pass.
2000	Ford	Focus	NLEV(LEV)	N/A	N/A	Pass	Pass	Pass.
2000	Honda	Accord	NLEV(LEV)	N/A	N/A	Fail	Pass	Pass.
2000	Chevy	Silverado	Tier 1/LDT3	Pass	Pass	N/A	Pass	Pass.

* Indicates that average of composites met standards, but one test result exceeded standard.